

## CLAIMS

1. A method comprising:

a) providing:

- i) an alginate salt,
- ii) a source of calcium ions, and
- iii) a calcium releasing compound;

b) mixing said alginate salt and said source of calcium ions to provide a mixture; and

c) adding said calcium releasing compound to said mixture to provide a three-dimensional crosslinked hydrogel system.

2. The method further comprising the step of:

d) culturing said three-dimensional crosslinked hydrogel system for growing cells *in vitro*.

3. The method of Claim 1, wherein said alginate salt is selected from the group consisting of sodium alginate and potassium alginate.

4. The method of Claim 1, wherein said alginate salt is prepared from an alginate source selected from *Macrocystis pyrifera* and *Laminaria hyperborea*.

5. The method of Claim 1, wherein said source of calcium ions is selected from the group consisting of calcium carbonate, calcium sulfate, and calcium sulfate dihydrate.

6. The method of Claim 1, wherein said calcium releasing compound is D-glucono- $\delta$ -lactone.

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7. The method of Claim 1, wherein said source of calcium ions is calcium carbonate and said calcium releasing compound is D-glucono- $\delta$ -lactone, and wherein the molar ratio of said calcium carbonate to said D-glucono- $\delta$ -lactone is 0.5.

5 8. The method of Claim 1, further comprising the step of implanting said three-dimensional crosslinked hydrogel system.

9. The method of Claim 1, wherein said three-dimensional crosslinked hydrogel system has a thickness of between about 4 mm and about 8 mm, and a diameter of approximately 18 mm.

10 10. The method of Claim 1, wherein said three-dimensional crosslinked hydrogel system has a calcium ion to carboxyl molar ratio of 0.27.

11. A method for tissue engineering *in vitro* comprising:

a) providing:

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- i) cells,
  - ii) an alginate salt,
  - iii) a source of calcium ions, and
  - iv) a calcium releasing compound;

b) mixing said cells, said alginate salt and said source of calcium ions to provide a mixture;

c) adding said calcium releasing compound to said mixture to provide a crosslinked hydrogel; and

20 d) culturing said crosslinked gel to provide a three-dimensional crosslinked hydrogel/cell system for growing said cells *in vitro*.

12. The method of Claim 11, wherein said alginate salt is selected from the group consisting of sodium alginate and potassium alginate.

13. The method of Claim 11, wherein said alginate salt is prepared from an alginate source selected from *Macrocystis pyrifera* and *Laminaria hyperborea*.

14. The method of Claim 11, wherein said source of calcium ions is selected from the group consisting of calcium carbonate, calcium sulfate, and calcium sulfate dihydrate.

15. The method of Claim 11, wherein said calcium releasing compound is D-glucono- $\delta$ -lactone.

16. The method of Claim 11, wherein said source of calcium ions is calcium carbonate and said calcium releasing compound is D-glucono- $\delta$ -lactone, and wherein the molar ratio of said calcium carbonate to said D-glucono- $\delta$ -lactone is 0.5.

17. The method of Claim 11, further comprising the step of implanting said three-dimensional crosslinked hydrogel/cell system.

18. The method of Claim 11, wherein said three-dimensional crosslinked hydrogel/cell system has a thickness of between about 4 mm and about 8 mm, and a diameter of approximately 18 mm.

19. The method of Claim 11, wherein said three-dimensional crosslinked hydrogel/cell system has a calcium ion to carboxyl molar ratio of 0.27.

20. The method of Claim 11, wherein said cells are osteoblasts.

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